National Institute of Environmental Health Sciences

Human responses to Middle Holocene climate change on California's Channel Islands

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Abstract:

High-resolution archaeological and paleoenvironmental records from California's Channel Islands provide a unique opportunity to examine potential relationships between climatically induced environmental changes and prehistoric human behavioral responses. Available climate records in western North America (7-3.8 ka) indicate a severe dry interval between 6.3 and 4.8 ka embedded within a generally warm and dry Middle Holocene. Very dry conditions in western North America between 6.3 and 4.8 ka correlate with cold to moderate sea-surface temperatures (SST) along the southern California Coast evident in Ocean Drilling Program (ODP) Core 893A/B (Santa Barbara Basin). An episode of inferred high marine productivity between 6.3 and 5.8 ka corresponds with the coldest estimated SSTs of the Middle Holocene, otherwise marked by warm/low productivity marine conditions (7.5-3.8 ka). The impact of this severe aridity on humans was different between the northern and southern Channel Islands, apparently related to degree of island isolation, size and productivity of islands relative to population, fresh water availability, and on-going social relationships between island and continental populations. Northern Channel Islanders seem to have been largely unaffected by this severe and phase. In contrast, cultural changes on the southern Channel Islands were likely influenced by the climatically induced environmental changes. We suggest that productive marine conditions coupled with a dry terrestrial climate between 6.3 and 5.8 ka stimulated early village development and intensified fishing on the more remote southern islands. Contact with people on the adjacent southern California Coast increased during this time with increased participation in a down-the-line trade network extending into the western Great Basin and central Oregon. Genetic similarities between Middle Holocene burial populations on the southern Channel Islands and modern California Uto-Aztecan populations suggest Middle Holocene movement of people at this time from southern California desert environs westward to the southern islands, a migration perhaps stimulated by increased continental aridity.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Security, Precipitation, Sea Level Rise, Temperature

Extreme Weather Event: Drought

Food/Water Security: Fisheries

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

General Health Impact

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type:

format or standard characteristic of resource

Research Article, Research Article

Resilience:

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale:

time period studied

Historical